**Turbomachinery Underwater Acoustic Source**

**Disclosure Number**

* 836

**Patent Status**

* Provisional Application

**For Licensing Information**

Richard Weyer  
Sr. Technology Licensing Officer  
Office of Technology Management  
[rmw4@psu.edu](mailto:rmw4@psu.edu)  
Phone: 814-865-6279  
Fax: 814-865-3591

The disclosed invention is a turbomachine capable of producing 180 decibels (re 1 µPa) of underwater sound pressure at 500 m for a frequency of 35 Hz.

**Background**

Harbors and ports remain a focus of the increased interest in homeland security. Effective countermeasures for underwater divers, or other means of intrusion into a port or harbor are lacking. As a result, there is a need to develop an alert and/or deterrence system for underwater intrusion that can generate very high underwater sound pressures at low frequencies.

**Invention Description**

The disclosed invention is a turbomachine capable of producing 180 decibels (re 1 µPa) of underwater sound pressure at 500 m for a frequency of 35 Hz. In contrast to a conventional vibrating mechanical surface source (i.e. airborne acoustic hailing devices), or other underwater piezo-based sound sources, this acoustic source concept is based on underwater turbomachinery and can thought of as an underwater "siren." Using monopole acoustic theory, the valve system of the device can be adjusted to provide optimum acoustic radiation. Independent control of both the thruster RPM and valve system provides variable frequency and amplitude control.

**Advantages**

Of benefit to marine military an defense operations as a possible underwater security device Potential for low cost compared to comparable piezo-based underwater sources. The system can be configured as a monopole acoustic source or a high intensity shaker. The system can generate its own fluid through-flow which makes it very applicable for continuous industrial or extraction applications.